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INSTALLATIONS FOR THE MANUFACTURE OF ANIMAL FOODSTUFFS

By J. AMMANN,
Dipl. Ing. ETH,
Uzwil, Switzerland

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Installations for the Manufacture of Animal Foodstuffs.

by J. Ammann, dipl.Ing.ETH, Uzwil, Switzerland.

Feeding of animals to produce meat, milk or eggs in the most economical manner has become a real science. Today the feed requirements of each animal for each stage of its life are well known, as well as requirements for medication, if any, to keep a herd or flock completely healthy. Optimal values of feed components like carbohydrates, fat, animal and vegetable proteins, minerals, vitamines, roughages have been established accurately. Combination of all factors will produce optimal figures of efficiency and economy in the production of milk, meat or eggs.

To fulfil these known requirements of the animals it is however necessary to revert to a great number of different raw materials which will only in their combination give a properly balanced diet. Feeding animals with a deficient diet will not only reduce the amount of animal products but will also increase the cost of these products considerably.

The raw materials used for the preparation of animal feed vary from country to country. A few of the more common ones are outlined below :

- grains like maize, barley, wheat, oats, sorghum
- oil cakes and oilmeals from soybeans, groundnuts, copra
- meat meal and fish meal
- offals from various industries: flour mills
  starch factories
  sugar refineries
- gras meal

To these many ingredients are added in usually very small proportions to supplement the naturally available raw materials or to obtain some special results:

- vitamines
- minerals
- medications

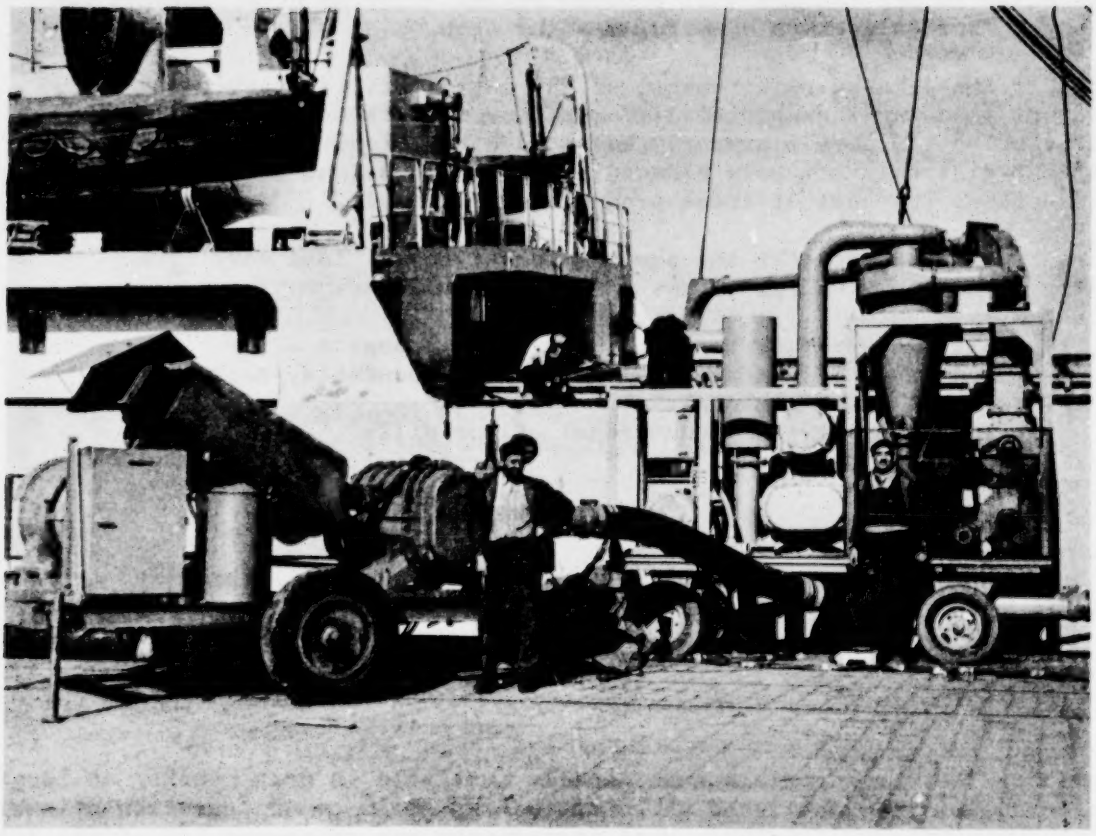
Based upon the raw materials economically available in each country or location feed formulas are established which contain up to 30 or 40 ingredients in widely varying proportions. In fact, some ingredients may represent 1/3 of the total mixture while others may only represent one part in 20 millions.

To proportion and distribute all these ingredients with the necessary accuracy through the mixture, new industrial methods and machines had to be developed and the feed milling industry was created.

Industrial feed mills have to deal with a number of basic problems for which some typical solutions will be shown:

a) Receiving

Many ingredients are normally shipped in bulk and bulk unloading from ships, trucks or cars is becoming of increasing importance. Smaller ingredients, however, are still most economically handled in bags.



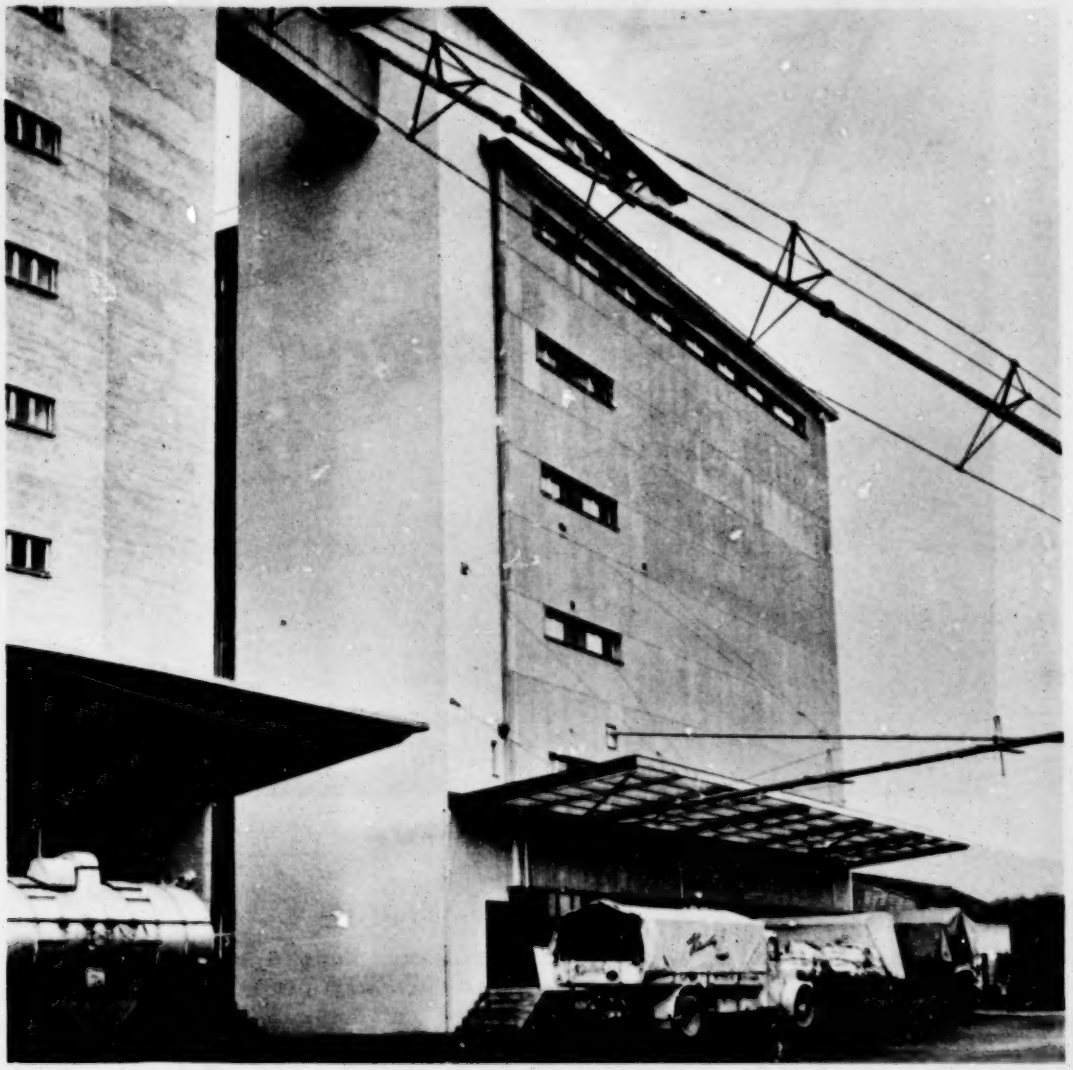
Ship unloading plant.

b) Storage

The methods of storing ingredients will vary according to their nature and importance. For grains conventional silos are in use. Many mealy raw materials (oil meal, mill offals) can be stored in specially adapted silo bins. The size of the storage installation must be determined after careful consideration of the raw material supply.

c) Cleaning

Scalping off course foreign matters is advisable in most cases,

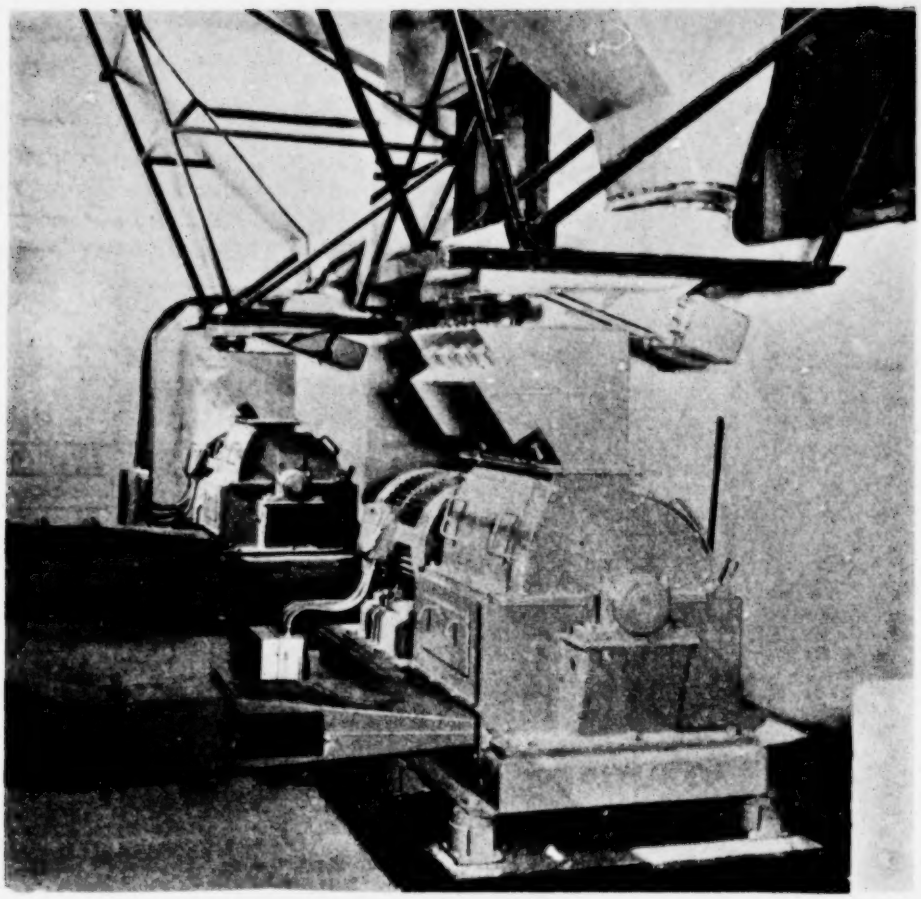


Storage plant for raw materials in meal form

Minor and hard flowing ingredients are kept in bags.

d) Size reduction

Grinding of grains and sometimes oil meals is most economically and flexibly performed with hammer mills combined with suction pneumatic.



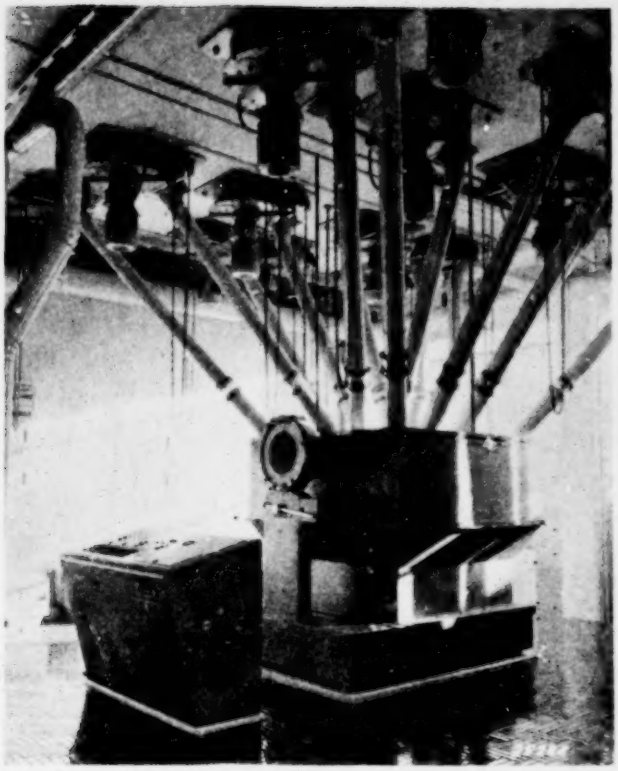
Hammer mill grinding plant.

e) Mixing

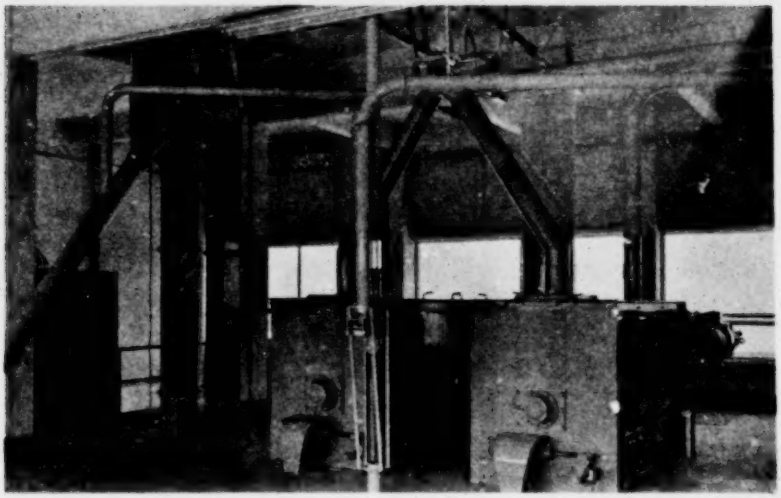
The heart of any feed mill is the mixing plant. Modern installations normally rely upon one or more scales for accurately proportioning the ingredients. Fully automatic punch card systems have been developed to make the mixing process completely independent from the human element and to assure absolutely constant formulations. Batches of 1, 2, 3 tons or more are thus prepared and dumped into a suitable mixer. Extremely small ingredients are normally premixed with some carrier before adding them to the main mixer.

Mixers have been perfected to a point where homogeneous distribution of all ingredients down to one part in 100,000 can be assured after a mixing time of 4 minutes. Homogenity is measured in samples of 10 grams and variations are smaller than 5%.

Output of mixing lines can vary from 5 tons per hour to 30 tons per hour or more.



Fully automatic
mixing plant

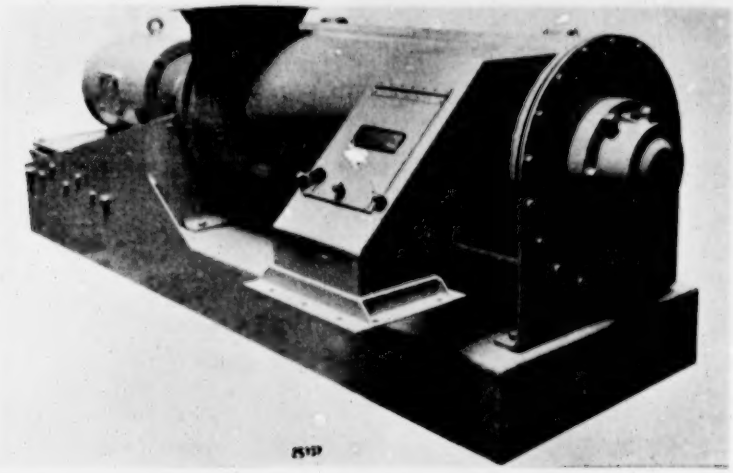


Batch mixers.

f) Molasses Mixer

Molasses and sometimes other liquid ingredients have to be added to the finished mixture by special continuous machines: these high speed mixers prevent any lumps from being formed.

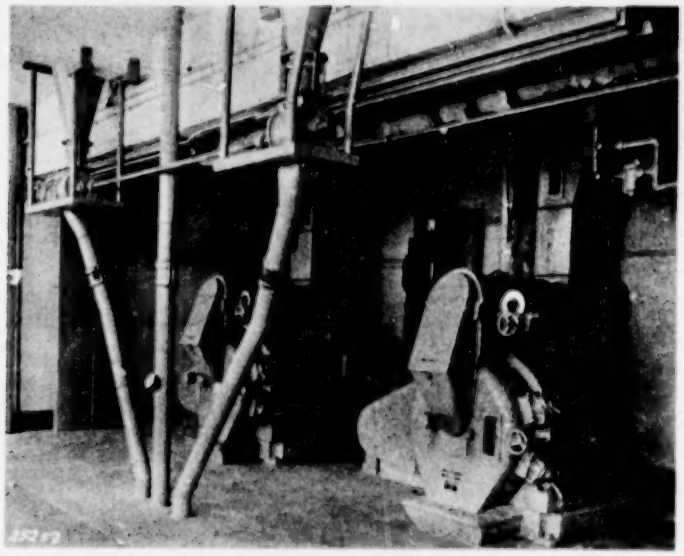
Precautions have to be taken to assure an even flow of molasses and meal to assure accuracy.



Continuous mollases mixer

g) **Pellet mills**

For many applications it has proved advantageous to form a finished feed mixture into solid pellets. Thus the animals cannot separate a once established mixture, feed intake can be higher and less losses will occur because of spillage or dust.



Pellet mills.

h) **Finished products**

Finished products are sold in bags or in bulk depending on the size of the orders.

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